ECON1004: Mathematics for the Social Sciences 2

Semester I & II

Pre-requisites: ECON1004 or A'Level Math
Lecturer: Xhano Soares
Office: E206 SAMB
Office Hours: Wed 10 am – 12 noon & Fri 11 am – 12 noon
                (If you cannot make these times you can email me or text or
                WhatsApp me at 406 – 7956 to arrange a meeting. P.S. Please
                don't send me any "Please call me" texts – I will not call.)

Description

This course builds on the basic ideas of Differential Calculus explored in ECON1003. Students will also be introduced to Integral Calculus and the mathematical processes that are required to access the quantitative elements of Economics and Management Sciences.

Learning Outcomes

Upon successful completion of this course, the student should be able to:

- Use L'Hopital's rule to evaluate a wide range of limits
- Find the derivatives of a variety of algebraic, transcendental and trigonometric functions of single and several variables.
- Use differentials to find approximations for functions of single and several variables
- Evaluate indefinite, definite and improper integrals using

        (i)   The power rule
        (ii)   substitution
        (iii)   integration by parts

- Use Maclaurin series to approximate definite integrals
- Use the definite integral to find area
- Find the relative extrema of functions of two variables (unconstrained and constrained)
- Evaluate double integrals over rectangular regions

Modes of Delivery

Two lecture hours and one tutorial hour per week. Problem sets (not for grading) will be provided for practice at problem solving.

Assessment

Course Work - 50%

- Two in – class quizzes (10% each)   20%
- One multiple choice exam   30%

Final Exam – 50%

Syllabus

1. Limits and Continuity

1.1 Properties of Limits
1.2 L'Hospital's rule for all indeterminate forms
1.3 Continuity over intervals
1.4 The Intermediate Value Theorem

2. Trigonometric Functions

2.1 The periodic nature of the sine and cosine functions
2.2 Radian measure
2.3 The graphs of the sine and cosine functions
2.4 The derivatives of the sine and cosine functions
2.5 The derivatives of the exponential and logarithmic functions
2.6 Apply L'Hospital's rule to Limits of Sin, Cos, exponential and logarithmic functions

3. Differentiation of Single Variable Functions

3.1 Total differentials and approximate changes
3.2 Taylor Series
3.3 Maclaurin Series (include Euler's formula)
3.4 The Mean Value Theorem

4. Integration

4.1 Indefinite Integration
4.2 Methods of Integration (substitution, parts, partial fractions)
4.3 The Riemann (definite) integral
4.4 The Fundamental Theorem of Calculus
4.5 Areas and Applications
4.6 Improper Integrals

5. Multivariate Calculus (2 and 3 variables)

5.1 Partial Differentiation
5.2 Total differentials and approximate changes
5.3 Implicit Differentiation and the Implicit Function Theorem
5.4 The Chain Rule
5.5 Concavity and Convexity
5.6 Optimization (unconstrained and constrained)
5.7 Homogenous functions and Euler's Theorem
5.8 Double Integrals

6. Differential and Difference Equations (If time permits)

6.1 Linear first order differential equations
6.2 Seperable equations
6.3 Integrating factors
6.4 Linear first order difference equations
6.5 Applications

Resources

Prescribed Text: Michael Hoy *et al*, *Mathematics for Economics, 2ⁿᵈ Edition.*